JAN 57

Progress Report for ~~SECRET~~ January 1957 on Clock Testing Program 1210-E-6C (dated 28 ~~March~~ Feb 1957)

Rec'd 13 Mar 57

During the first week in January, five clocks were subjected to the -40°F. test, of which three clocks failed to fire. Due to the failures in both the 30 day high temperature storage test the previous month and the -40°F. test, it was recommended by the Project Officer that the above tests be repeated with new clocks. Seven canned clocks were selected from stock and all were subjected to the quick leak test. After this test in which it was found that one of the cans leaked, two cans were subjected to the 10 foot drop test and in one case the lid split open at the canning seal. (See Photograph) The other can from the drop test was again subjected to the quick leak test and found to leak.

Following these tests all seven clocks were run twice at ambient temperature to determine their accuracy, and the first five were then placed face down at 130°F. for the 30 day test. The other two clocks, (numbers 6 and 7, which had been dropped), were subjected to the 200 ft. water submergence test. Both functioned normally in this test, but on the ambient rerun to check for accuracy, one failed to fire. This clock was set aside for dispatch to the Project Officer for examination after cursory inspection indicated that the clock had failed to run long enough to fire despite a full wind. ? Q words

The second clock (no. 7) was rerun a second time and then with two clocks from the original lot (nos. 1 and 2) were attached to soldered up adapters and run for 24 hours submerged in gasoline. All three clocks functioned normally, but on the ambient rerun at the end of the test, one clock (no. 7) failed to fire. Failure appeared to be due to the same cause as before, and it was also dispatched to the Project Officer for examination.

Future Work

The 30 day 130°F test will be completed in the middle of February and the clocks will then be subjected to the -40°F. test.

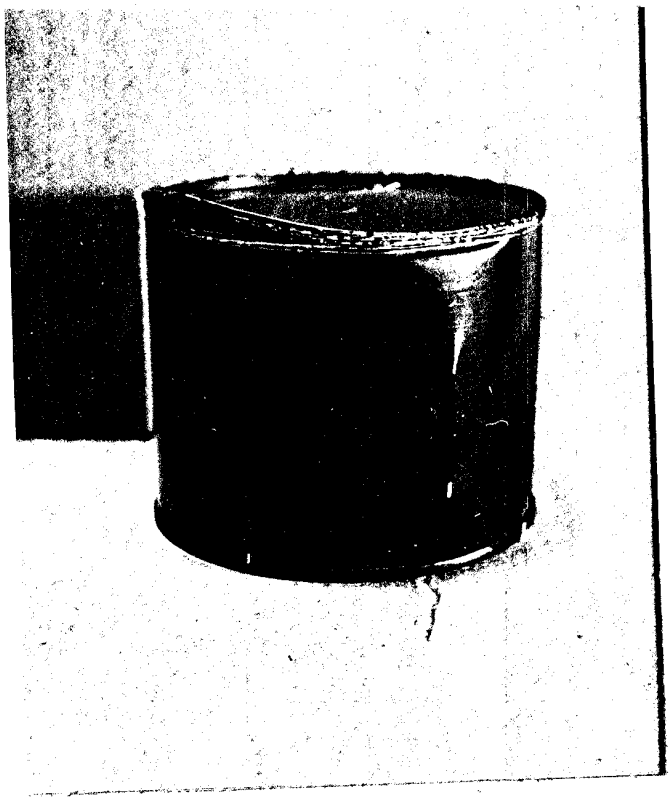
Financial Statement

Total Amount of Contract	$1,984.50
Obligations for January, 1957	775.92
Total Obligations to 27 January 1957	1,628.58
Balance of Contract	355.92

Expiration Date - 30 June 1957

1 Progress Reports Dec '56-Jan '57, Cl[illegible]

25X1



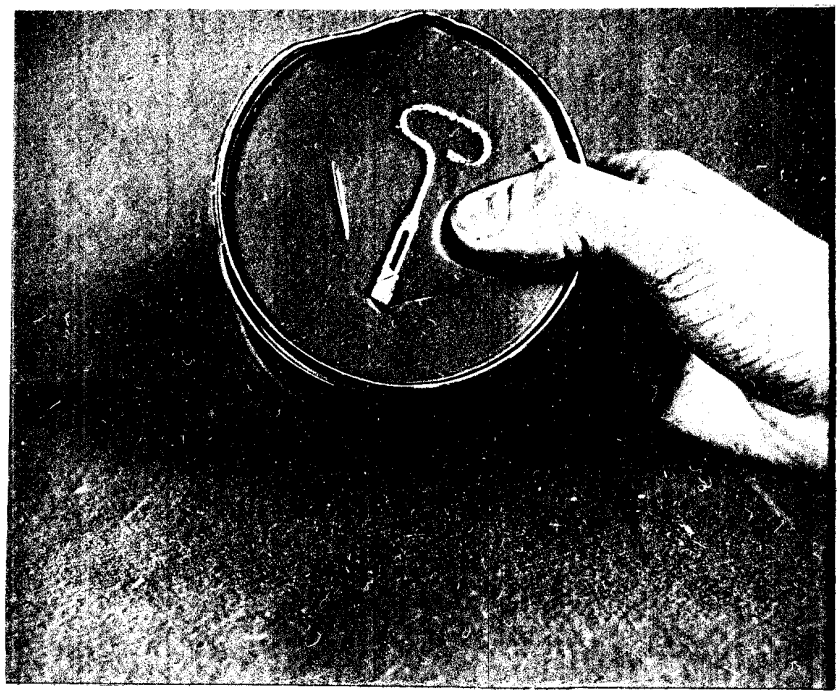
CONFIDENTIAL

~~SECRET~~

Progress Report for Dec. 1956 on Clock Testing Program - 1210-E-6c dated 23 Jan 57.

At the beginning of December preparations were made to drop from two to five canned clocks, dependent upon the results of the initial two drops. Photographs No. 1 and 2, show the deformation of the cans, after each had been dropped twice, once sideways and once face down.

Though in the case of can No. 1 the rolled edge was deformed to the point that it might not be water-tight, only superficial damage was done to the contents. Namely the winding key and chain became detached from the clock. (See Photograph No. 3) In the other can the clock fell against the side of the can producing an indentation in the side of the latter, caused by the starting knob striking the can. This knob was found to be slightly stiff to operate. In addition one of the keys attached to the outside of the can broke off. (See Photograph No. 2) Both clocks and the other three belonging to this group were run twice at ambient to determine their accuracy, at the completion of the above test.



PHOTOGRAPH NO. I

~~SECRET~~

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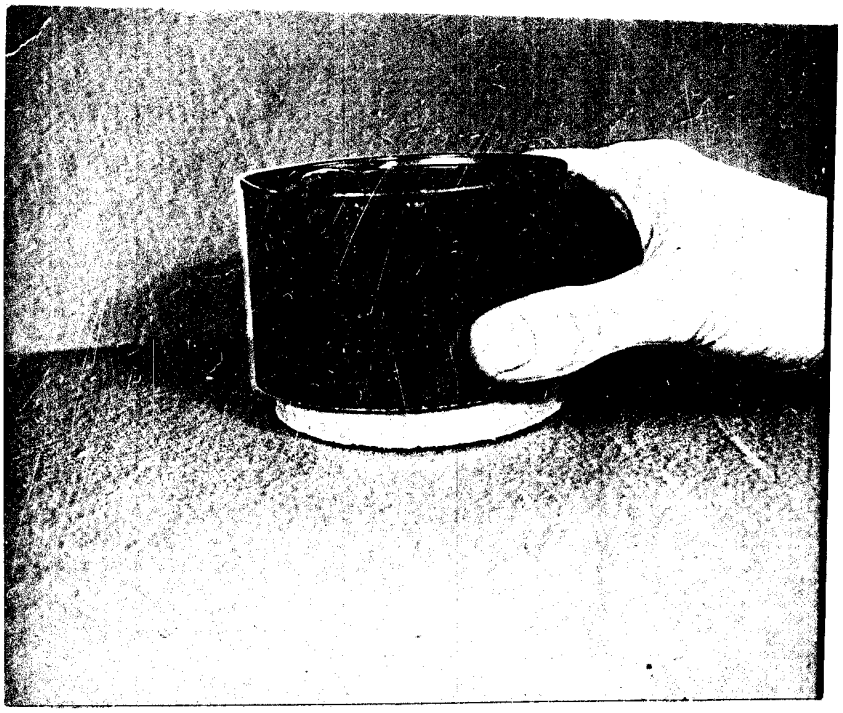
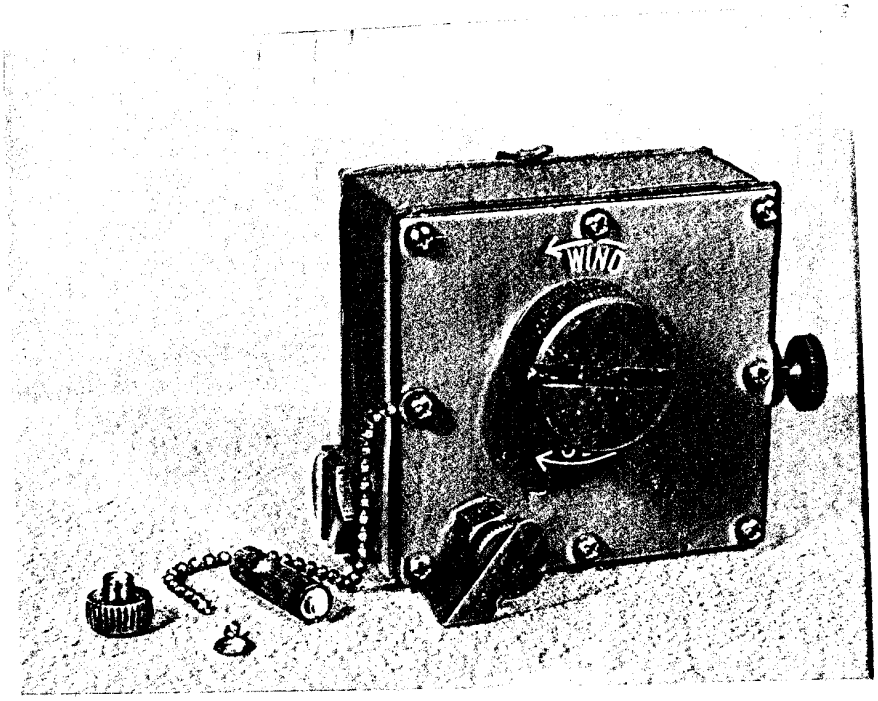


PHOTOGRAPH II



PHOTOGRAPH III

Towards the end of the month the thirty day, 130° F. test was completed. After allowing the clocks to return to ambient temperature they were set and run for twenty-four hours and all five failed to fire. After standing over the four day holiday week-end they were rerun and this time all five clocks fired. However, there was some deviation from their original accuracy prior to heating, so it was deemed desirable to rerun them to determine their reliability before using them on the low temperature test. Both the rerun and the low temperature tests should be completed by early January.

During the course of the month two clocks, one taken from a can that had been dropped and one other, both previously checked for accuracy, were equipped with an adapter whose firing pin had been removed and the end soldered water tight, they were then submerged in water at a pressure equal to 200 feet and run for twenty-four hours. One clock functioned normally and one failed, the latter had been through the drop test and had functioned normally on the two accuracy tests. This clock was rerun and when it failed a second time was examined closely. The cause of the failure was found to be due to a broken main spring. Therefore, another clock will be selected and the test repeated.

Future Work

The low temperature test and the gasoline submergence test, including the retesting of one clock with an initiator will be performed.

Financial Statement

Total Amount of Contract	$ 1,984.50
Obligations for December, 1956	528.93
Total Obligations to 23 December 1956	1,276.96
Balance of Contract	707.54

Expiration Date - 30 June 1957

Progress Rpt. for Nov 56 on Clock Testing Program

1210-E-6C
DATED
21 DEC 56

During the first part of November the five (5) clocks that had been in storage for twenty (20) days at 130° F. were removed and tested at ambient temperature for accuracy. The results of the test showed that three (3) clocks fell within the time limits set, but two (2) clocks were a little over two minutes respectively fast and slow. The information was reported to the Project Officer who scheduled a trip and discussed the program at some length. On the basis of this discussion the general scope was changed, but only in the details of each test.

First, the tests would all be rerun using new clocks, instead of the reworked ones. In addition the clocks would all be run twice before they were tested in order to determine the accuracy of each clock more exactly. Further two (2) canned clocks would be dropped twice from ten (10) feet and the condition of the cans and clocks inspected and tested. Iron steel plate

Following the above changes in the scope, the test on the five (5) clocks at high temperature was immediately started. The clocks were run for two (2), twenty-four periods. Of the five (5) clocks, four (4) clocks had a variation of from 15 seconds to 1 minute and 55 seconds between first and second runnings. The fifth clock had a difference of 6 minutes and 41 seconds. The clocks, each one numbered, were then placed face down at 130° F. and will remain for 30 days.

Future Work

The functioning of four (4) clocks after 24 hour submergence under gasoline will be tested. Adapters will be attached, but the firing pins will be cut off and the adapters sealed against possible water penetration.

Two (2) canned clocks will be dropped from 10 feet, both sideways and on one face.

Financial Statement

Total Amount of Contract	$1,984.50
Obligations for November, 1956	370.50
Total Obligations to 30 November 1956	748.03
Balance of Contract	1,236.47

Log 4
ED 9-30

SECRET

Progress Rpt. for Oct 56 on Clock Testing Program
1210-E-6C dtd 28 Nov 56.

Work was initiated during the month of October on the testing of the JAP 24-hour clocks. Five (5) clocks were placed in the surveillance cabinet at 130 deg. F and will remain for 20 days when they will then be started and checked for accuracy at that temperature. This test is due for completion early next month.

Tests of the functioning of the clock attached to the limpet were also completed. In this test the clock was set for 20 minutes but not started and the safety pin was not removed. It was then attached via its adapter to an M-34 detonator and a limpet. Care was taken to see that all joints were screwed up as tightly as possible. The assembled unit was then left submerged in 18 inches of water for 24 hours. The entire unit was then removed from the water and the outside of the clock carefully dried off and inspected by visual observation to see whether any water had entered. The clock was then started and the safety removed at which time the whole unit was re-submerged. In this test the limpet was successfully initiated.

A similar test using a clock attached to an initiator was also performed, in which both were put under 18 inches of gasoline for a period of 24 hours. However, at the end of 24 hours, when the unit was removed for inspection, it was noted that gasoline had in some way entered the clock. The clock was set for 20 minutes, started as in the previous experiment and replaced in the gasoline. After waiting for a period of one hour, the clock had not functioned, and the initiator was therefore detonated using the secondary electrical firing system.

At the request of the Project Officer this test will be re-run with an additional four (4) clocks. However, the initiator will be omitted, the adapter will have its pin cut off and the open end will be welded shut.

Future Work

Complete high temperature storage test, low temperature storage test, 200 foot water immersion test, and the gasoline immersion test.

Financial Statement

Total Amount of Contract	$1,984.50
Obligations for October, 1956	377.13
Total Obligations to October 21, 1956	377.13
Balance of Contract	$1,607.37

ED 2:10

SECRET

Progress Report for Jan 56 on Test Study on Two Mechanical Timing Devices - 1210-C-11

20 Feb 56

The month of January brought the progress of the contract through the major portion of the scope. The tripping error test has been completed on the twelve hour clocks and a portion of the cold test. The cold test work has been done on the small 45 minute clocks which are now undergoing tests in the hot cabinet.

In general, the small clocks have performed satisfactorily, with only two units mechanically defective. One other unit has run consistently fast. In the cold test, most of the clocks worked satisfactorily at -5°F. although three out of four units failed to operate at -10°F.

The twenty-four hour clocks, on the whole, are not as satisfactory. In the "as is" test four units were inoperative. As testing progressed, some of these units became operative and others developed defects. During the later part of the tripping error tests, five units were set aside as being mechanically defective and others were subject to erratic stoppages. Most of the remainder were functioning correctly at -10°F. although two were running slow.

The testing program is expected to be completed approximately February 15, at which time the final report will be written.

Financial Statement

Total amount of contract	$ 4,313.25
Obligations for January, 1956	655.43
Total obligations to January 31, 1956	1,143.27
Balance of Contract	3,169.98

Expiration Date - February 28, 1956

Progress Report for Dec 55 on Test Study on Two Mechanical Timing Devices - 1210-C-1 dtd 20 Jan 56.

Work during December primarily concerned planning each contemplated test. The details of these tests will be found on a separate sheet of this report.

Jigs have been completed to test both the large and the small clocks. A means has been provided so that the small clock trips an alarm light. The large clock automatically switches off its individual master clock when tripped.

Tests A and B are completed on the small clocks and will continue on the large clocks.

Financial Statement

Total Amount of Contract	$4,313.25
Obligations for December, 1955	487.94
Total Obligations to December 31, 1955	487.94
Balance of Contract	3,825.31

Expiration Date - February 28, 1956

Logged 1/27/56 JJS.

TEST PROCEDURE

A. Number: B-1, 2, 3, etc. (big clocks)
S-1, 2, 3, etc. (small clocks)

B. Run in (completely down)

C. Time "as is"

RT
1. Fully wound.
2. Check against standard clock for full scale of test clocks.
3. Big and small.

D. Tripping error (big clocks) per unit tested

1. Set for 3 hours. Determine actual elapsed time. Repeat 3 times and average.
2. Repeat step 1 for 6 hours, 9 hours and 11 hours.

E. Cold Test

1. Quick rundown on temperature to find the point that 1 out of 5 units fail to operate.
2. Run groups 10°F. above that "zero level". ✓ for reliability @ that temp.
3. Re-run step 2 to get reproductibility. for each unit
4. Only if some 30 fail at steps 2 and 3, re-run groups 10° higher or more until all operate (100% reliability).
5. Re-run group at "zero level" to get % failure.

F. Hot Test

1. Run 3 units at 120, 140, 165°F. to see if the plastic holds up.
2. If satisfactory at 165°F., run groups at 140°F.
3. Re-run group for reproductibility.
4. ✓ If necessary, re-run at 120°F. to get 100% reliability with not more than 5% error.

Assume all 30 are operating at this point. Divide as follows:

Record error @ the max. op. temp.

Vibration	15
Drop	5
Aging	3
Firing Tests	3
Save	4 of each

Transportation 2 hrs. check accuracy

G. Vibration (15 units)

3 criteria for vibration

1. Run 2 - 3 units to find vibration limits. for what?
2. Vibrate 4 units running and determine accuracy and safeness (not to set off while vibrating). Watch small carefully (may need ohmmeter) for shorts.
3. Vibrate 4 units not running and determine accuracy after vibration. 6-8 hr for surge
4. Run 2 units at ½ frequency in boxed condition. Should still operate accurately. If not, run 2 units at ¼ frequency in boxed condition. also will find vibrations for shorting contacts

Boxed (items 3–4)

45 min. boxed

H. Drop Test (5 units)

Drop 10 feet onto wood and not fire (Check small clocks with ohmmeter).

I. Artificial Aging (3 units)

Subject units to:

1. 4 hours @ 120°F. and 90% R.H.
2. 2 hours @ 78°F. and 90% R.H.
3. 2 hours @ 0°F.
4. 16 hours @ 35°F. and 20% R.H.

Repeat for 3 cycles.

5. Test for accuracy.

Larry,
Any recommendations for redesign?
How about adapters?

J. Firing Tests (3 units)

1. Large
   A. Test with coupling bases and primer.
   B. Test with P-unit.
   C. Test with M-34 Detonator.
2. Small
   A. Test with M1A1 Squib
   B. Test with Corps of Engineers detonator.

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K. Spring Tests

Test 5 cocked and 5 uncocked springs after 8 hours @ 165°F. for dimensional change. Effect of heat on a cocked firing spring. Check out w/ P or M-34 after heat if dimensions

$90 = \frac{62.4}{.44} X$

$\frac{44 \times 90}{62.4}$

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6. Vibration (15 units) for a short time

1. Run 2-3 units, to determine amplitude and frequency at which units will not:
   1) run
   2) run following the vibration
   3) be safe

2. Vibrate 4 each units running at amplitude & frequency analogous to normal transportation conditions
   45 min for small (check for shorting of contacts)
   6-8 hr. for large
   check for accuracy & safeness

3. Run small for 2 hrs. hoped, and check accuracy of for vibrating — run large hoped for 2 hr. & check accuracy after vibrating

4. Determine resonant frequency of contacts

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